S. L. MARKHAM.

ANGULAR COIL SPRING.

APPLICATION FILED NOV. 5, 1918.

1,349,079. Patented Aug. 10, 1920.

Fig. 1.

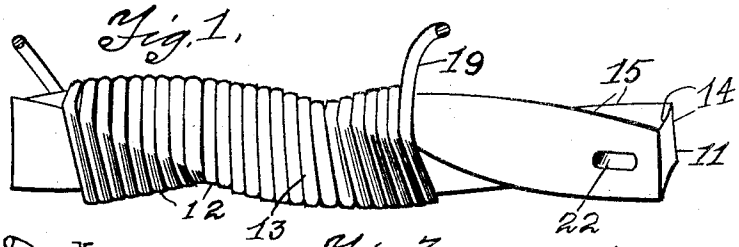


Fig. 2.

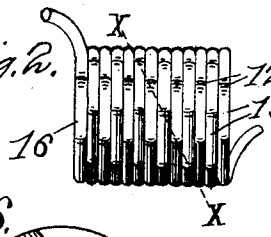


Fig. 3.

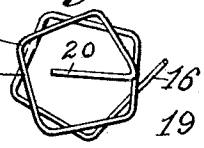


Fig. 4.



Fig. 6.

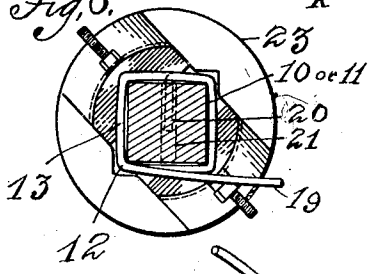


Fig. 5.

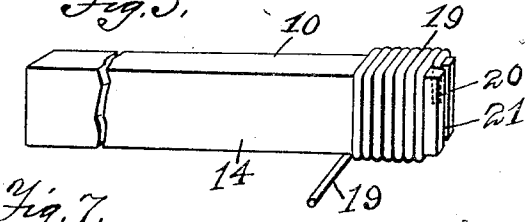


Fig. 7.

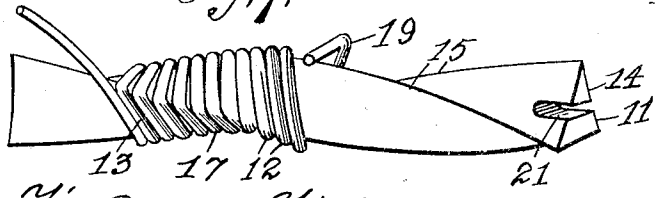


Fig. 8.

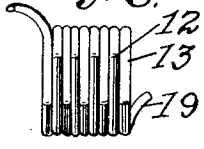


Fig. 9.

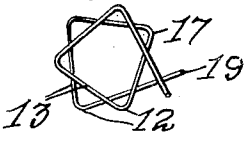


Fig. 10.

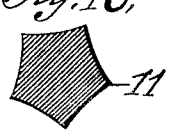
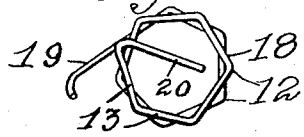


Fig. 11.



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Witnesses

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UNITED STATES PATENT OFFICE.

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ANGULAR COIL-SPRING.

1,349,079. Specification of Letters Patent. Patented Aug. 10, 1920.

Application filed November 5, 1918. Serial No. 261,278.

To all whom it may concern:

Be it known that I, SIDNEY L. MARKHAM, a citizen of the United States, residing at the city of Jamestown, in the county of Chautauqua and State of New York, have invented certain new and useful Improvements in Angular Coil-Springs, of which the following, taken in connection with the accompanying drawings, is a specification.

The invention relates to coil springs. In the formation of coil springs a highly beneficial quality of such a spring is one in which the spring is instantly active under stress throughout its entire length and particularly when said spring is used with torsional strain, also to increase the torsional power of the spring without impairing its other qualities.

The object of the improvement is to provide a coil spring having a continuous succession of alternating angular bends and straight portions or legs in the wire coil whereby the torsional strength and activity of the spring is greatly increased and the other qualities of the spring are enhanced including the appearance of the spring; and the invention consists in the novel features and combinations hereinafter set forth and claimed including the method of making said coil spring.

In the drawings, Figure 1 is a perspective view of an angular mandrel which is quadrilateral in cross section with wire coiled thereon to make the improved form of coil spring, the mandrel being shown spirally twisted. Figs. 2 and 3 are side and end elevations of the angular coil spring removed from the mandrel showing the manner in which the spring of the wire causes the coil spring to spring outwardly from the mandrel when released therefrom thereby bringing the angular bends midway of the length of the adjacent straight portions or, as it were, causing said angular bends to break joints alternately with said straight portions throughout the length of the wire in said spring coil, the end elevation in Fig. 3 showing the pentagonal form which the wire coil assumes when released from the quadrilateral shaped mandrel. Fig. 4 is a detail of one of the bends in the spiral coil showing the straight leg each side of said bend. Fig. 5 is a perspective view of a straight sided angular mandrel which is qualrilateral in cross section showing the manner of winding the wire thereon with the slotted end for holding the end of the wire in starting the wind; and Fig. 6 is an elevation of an angular mandrel which is quadrilateral in cross section as clamped in a chuck for winding the wire thereon in a machinist's lathe or similar device. Fig. 7 is a perspective view of a triangular mandrel with the wire wound on the same, said mandrel being shown spirally twisted, and Figs. 8 and 9 show side and end elevations of the wire coil removed from the triangular mandrel showing the angular shape into which the wire coil springs when released from its close winding tension on said triangular mandrel. Fig. 10 is a crosswise sectional view of a pentagonal shaped mandrel; and Fig. 11 is an endwise view of the hexagonal form into which the spiral coil springs or relaxes when released from the close winding tension on the pentagonal shaped mandrel.

Like characters of reference refer to corresponding parts in the several views.

The numeral 10 designates a straight sided mandrel which is quadrilateral in cross section; and the numeral 11 designates a mandrel which is spirally twisted and is quadrilateral in cross section with slightly concave sides, which mandrels are used to coil my improved spring thereon. The spiral twisting of the mandrel gives a slightly easier release to the coiled wire and is more apt to insure the angular bending of the coiled wire 19 in regular succession. Either form of mandrel 10 or 11 however will attain my purpose.

The improved coil spring consists of a succession of substantially equal straight legs or coil sides 13 separated by angular bends 12, that is, the angular bend 12 has a straight coil side or leg 13 each side thereof, the bends 12 being at such an obtuse angle as to form a many sided coil, in which by my process of construction the angular bends 12 occur midway of the length of the straight sides 13 in the adjacent coils. Said straight sides 13 act as levers to which the angular bends 12 provide a fulcrum so that there is a continuous series of levers and fulcrums provided throughout the length of the coiled wire so that substantially any torsional strain upon any part of the spring is communicated to the remainder thereof. Thus, for example, a torsional strain at one end is almost instantaneously felt at the opposite end of the spring.

The method of making this improved coil spring with its succession of angular bends 12 and straight sides 13 consists in mounting a mandrel, angular shaped in cross section, so that it may be rotated and providing means for the rotation of the same. Also providing means for the progressive feeding of the wire on to the rotating mandrel. The angular mandrel is for most springs preferred in the straight form shown in Fig. 5 and may have as many sides 14 as it is desired to have coil sides 13 in the coil spring except that the mandrel should have one less side than the desired coil spring since the wire 19 is wound on the angular mandrel under tension so that it is drawn firmly across the corners 15 of the mandrel thereby forming the angular bends 12 and providing the straight sides 13 in the angular coil.

The sides 14 of the angular mandrel may be flat as shown in Figs. 5 and 6 or having a slight concavity so that the edges or corners 15 project and give a slightly sharper angular corner 12 for the coil. Thus when it is desired to have a pentagonal sided spring as shown at 16 in Figs. 2 and 3 a quadrilateral shaped mandrel 10 or 11 is used and when a four sided spring is desired as shown at 17 a triangular shaped mandrel is used as shown in Fig. 7 or when a substantially hexagonal or six sided spring is desired as shown at 18 in Fig. 11 a pentagonal shaped mandrel is used as shown in Fig. 10.

In order to wind the springs in perfect coil alinement the mandrels are preferably provided with an open slot 21 in the end thereof into which the angularly bent end 20 is inserted to start the coil. A closed slot 22 may be used though it is not quite so easy of insertion as the open ended slot 21. The angular mandrel is preferably placed in a chuck 23 which will firmly hold the same and inserted in a machinist's lathe or similar device so that the mandrel 10 or 11 may be rotated at a given speed. Such a lathe or machine provides means for the progressive feeding of the wire 19 onto the rotating mandrel 10 or 11 under tension so that it is drawn firmly across the corners 15 of the mandrel 10 or 11 thereby forming the angular bends 12 in regular succession between the straight sides 13.

It is usually preferable however to wind the wire 19 with a small amount of temper so that while under said tension the mandrel may be turned backward on the wrapped wire about one-third of a turn or until the coil releases from the mandrel thereby easing the release of said wire and giving the pleasing breaking of joints; said slight temper in the wire causes the coiled wire to spring into the desired form wherein the bends 12 are midway of the length of the straight sides 13 in the adjacent coil. It is this backward movement of about half the length of one of the legs 13 which produces the additional side in the angular coil spring than the mandrel upon which it is wound.

This spiral arrangement of the alternating angular bends 12 and straight sides 13 gives a pleasing appearance or design to the spring coil. At the same time the torsional strength of the coil is largely increased and the torsional activity is correspondingly increased. Indeed there is no office which a coil spring can perform in which the action of the angular coil spring is not an improvement on account of its greater activity or rapidity of action.

I claim as new:—

1. A torsional spring composed of a series of contacting coils closely wound under tension, each coil consisting of a series of straight sides joined by bends, the bends of adjacent coils being uniformly offset to maintain the general cylindrical shape of a coiled spring.

2. A torsional spring composed of a series of closely wound contacting coils of polygonal shape, said coils wound under tension sufficient to uniformly and progressively stagger the bends of the coils relative to one another whereby the periphery of the generally cylindrical spring will be provided with spiral series of projections.

In testimony whereof I have affixed my signature in the presence of two witnesses.

SIDNEY L. MARKHAM.

Witnesses:
H. A. SANDBERG,
A. W. KEITH.